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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCT193/510 TK	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2003/000624	International filing date (day/month/year) 27.08.2003	Priority date (day/month/year) 19.09.2002
International Patent Classification (IPC) or national classification and IPC C23C 8/06, C23C 16/00 // C23F 11/02		
Applicant MIKKELIN AMMATTIKORKEAKOULUYHTYMÄ et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 05.04.2004	Date of completion of this report 02.12.2004
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000624

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1 - 14 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished

pages* _____ as amended (together with any statement) under Article 19

pages* 16 - 19 received by this Authority on 09.08.2004

pages* _____ received by this Authority on _____

☒ the drawings:

pages 1 - 2 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (*specify*): _____

☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-12</u>	YES
	Claims	<u>13-15</u>	NO
Inventive step (IS)	Claims	<u>1-12</u>	YES
	Claims	<u>13-15</u>	NO
Industrial applicability (IA)	Claims	<u>1-15</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1) US-4623400-A
D2) WO-0047797-A1
D3) US-5 186 120-A
D4) SE-145039-A
D5) US-4810510-A
D6) US3106473-A

The present invention relates to a method and to an equipment for surface treatment of the surface of a metal. The object of the invention is to make it possible to perform the surface treatment in a mobile equipment and to treat large objects.

Claims 1-12

Amongst the documents cited in the search report, document D1 comes closest to the invention according to the amended claims 1-12 of August 9, 2004.

D1 (col.3, lines 4-43, fig. 1 and claim 1) discloses a process and an apparatus for surface coating of a metal. The process is carried out in a fluidised bed reactor. The apparatus contains a supply vessel (1) for evaporating a liquid metal halide into a stream of inert gas, piping and a plenum (4) for transferring the gas into a reactor (2). The workpiece is placed in the reactor and is surface coated. In order to control the temperature, an electric heater (7) is connected to the vessel (1). Waste gas is transported out of the reactor

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: BOX V

(2) at its top.

The method in claim 1, the equipment in claim 8 and the use in claim 12 differ from what is revealed in D1 in that the surfacing material (10) comprises compounds arising in dry distillation of deciduous-wood. Hence, the invention is novel.

The problems in connection with manufacturing surfacing material for surface treatment of metal surfaces to be solved by the present invention are not disclosed in D1. This document does not give any indication that would lead a person skilled in the art to the claimed method, equipment and use. Therefore, the claimed invention is not obvious to a person skilled in the art.

Consequently, the invention according to claims 1-12 is considered to involve an inventive step.

Claims 13-15

The material as such, stated in amended claims 13-15, is not novel. It does not differ from what is explicitly or inherently disclosed in for example D5 (col.1, line 28-col.2, line 25, col.5, line 30-col.6, line 28, fig.10 and claim 2). This document reveals materials that arise in dry distillation of wood, such as alder and hickory, i.e. a deciduous-wood (cf. p.14, lines 25-35 and present claim 12). Refer also to D6 (col.1, lines 20-54 and col.3, lines 73-74).

It is pointed out that a material (i.e. a product) must, as such, be novel and has to involve an inventive step, independent of how it is going to be used (in present case as a surfacing material for surface treating a metal surface).

Industrial applicability

The invention in claims 1-15 is considered to be industrially applicable.

Concerning observations on clarity in claims 8-15, see Box VIII.

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 8-15

According to PCT Article 6, the claim or claims shall define the matter for which protection is sought.

Claims 8-15 are vaguely defined in that they do not refer to the specific method in present case. Consequently, including a reference to the method in claim 1 would clarify claims 8-15.

CLAIMS

1. A method for surface treating the surface (11') of a metal, in which the surface treatment is performed in a surfacing chamber (33), using a surfacing material (10), which is formed of one or more compounds and possible additives, and in which
- the surfacing material (10) is brought to a principally gaseous state,
 - the surfacing material (10) is led to the chamber (33), and
 - the surfacing material (10) is permitted to react with the metal surface (11') being treated,

characterized in that the metal surface (11') being treated is subjected in the chamber (33) in which there is a through flow of the surfacing material (10) to an exhaust connection (29), and in which the said surfacing material (10) comprises compounds arising in dry distillation of deciduous-wood.

2. A method according to Claim 1, characterized in that the surfacing material is formed in the point of application from at least two fractions, of which the first fraction includes compounds (BIRCH-TAR(1)) condensed in the said dry distillation process and the second fraction includes uncondensed compounds (CO(g), H₂(g), CO₂(g)).

3. A method according to Claim 2, characterized in that when the surfacing material (10) is formed, part of the compounds included in the surfacing material (10) are brought to the process in a solid state.

4. A method according to any of Claims 1 - 3, characterized in that part of the surface (28') being treated can comprise at least part of the internal surface of the said chamber (33).

5. A method according to any of Claims 1 - 4, characterized in that the surface-treatment process includes in addition one or

more intermediate scavenging stages, in order to at least dry the surface layer (11', 28').

6. A method according to any of Claims 1 - 5, characterized in that at least part of the surface (11', 28') being treated and of the surfacing material (10) are charged electrically to different potentials, in order to bring the surfacing (10) to the surface (11', 28') being surfaced.

10 7. A method according to any of Claims 1 - 6, characterized in that at least part of the wall of the surfacing chamber (33) is charged electrically to a different potential relative to the surfacing material (10), the surface (28') being surfaced being part of the wall of the chamber (33).

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8. Equipment for surface treating a metal surface (11'), which includes

- 20 - means (14, 13) for manufacturing a surfacing material (10), such as, for example, bringing it from a liquid state into a gaseous state,
- a surfacing chamber (33) equipped with at least one input connection (17), in which the metal surface (11') to be surface treated is arranged and
- 25 - surfacing material (10) feed piping (16) fitted between them, which is connected to the said input connection (17) of the surfacing chamber (33),
- at least one exit connection (29) arranged in the surfacing chamber (33), through which the said gaseous surfacing material (10) is arranged to be led out of
- 30 the chamber (33),
- possible auxiliary and storage equipment (CTRL, 24, 21.1, 21.2, 22, 18), for example for regulating the process quantities and controlling the surfacing process and

- means (25, 21.1, 20.1, 19.1) for leading gaseous compounds (CO(g) , $\text{H}_2\text{(g)}$) as its own fractions for manufacturing the surfacing material (10),

characterized in that the said surfacing material (10) is arranged to form from compounds arising in dry distillation of deciduous-wood from which at least part is separated one or more fractions and which fractions are again arranged to be combined by means of the equipment when manufacturing the surfacing material (10) in connection with the equipment.

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9. Equipment according to Claim 8, characterized in that the wall structure of the surfacing chamber (33) is arranged from an elastic material, so that it can be advantageously arranged according to the shape of the surface (28') being surfaced.

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10. Equipment according to Claim 8 or 9, characterized in that the wall structure is assembled from units attached to each other.

20 11. Equipment according to any of Claims 8 - 10, characterized in that at least the surfacing chamber (10) is arranged as a moveable unit, in order to arrange continuous surfacing.

12. Use of compound arising in dry distillation of deciduous-wood as a surfacing material (10) for surface treating a metal surface (11').

13. A surfacing material according to Claim 12, characterized in that the surfacing material is gasified directly from the wood material (BIRCH(s)).

14. A surfacing material according to Claim 12, characterized in that the surfacing material (10) is arranged to be formed from at least a gaseous fraction (CO(g) , $\text{H}_2\text{(g)}$, $\text{CO}_2\text{(g)}$) and a liquid fraction (BIRCH-TAR(l), $\text{H}_2\text{O(l)}$).

15. A surfacing material according to Claim 14, characterized
in that the surfacing material (10) is additionally formed from
a solid fraction.